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Piya Tansiri
King Mongkut's Institute of Technology Ladkrabang, Thailand, piya.ta@kmitl.ac.th

Thanin Ratanaolarn
King Mongkut's Institute of Technology Ladkrabang, Thailand

Krissana Kiddee
King Mongkut's Institute of Technology Ladkrabang, Thailand

Paitoon Pimdee
King Mongkut's Institute of Technology Ladkrabang, Thailand

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RESEARCH BRIEF

21st Century Attributes of Thai Interior Architects, Designers, and Academics

Piya Tansiri*, Thanin Ratanaolarn, Krissana Kiddee, and Paitoon Pimdee
King Mongkut's Institute of Technology Ladkrabang, Thailand
piya.ta@kmitl.ac.th

According to Torino (2017), history and culture have been shown to play a significant role in 21st century interior design. As such, it is critical that students study the history of places, the people, and the culture as well as the architecture itself. To better understand their design project, interior designers should understand history and geography as well, and have confidence in their knowledge of the people and a project area's culture. This knowledge can better help a designer develop design concepts, as well as projects related to historic restorations and rehabilitations. Finally, Torino (2017) feels that understanding diverse cultures will also help the designer understand contemporary ethnic diversity, which is a reality on which we can dwell and prosper.

The idea of rejuvenation through a celebration of design deserves praise, and in Thailand, the government is trying to pitch Bangkok as the "World Design Capital" by 2022 **(Wattanasukchai,** 2018). In Asia, Seoul (2010) and Taipei (2016) have previously been named as the World Design Capitals, an award designated every two years. As part of this process, the Thailand Creative & Design Centre (TCDC) has occupied what was once the Central Post Office and will use it as the hub for projects leading to Bangkok hopefully being declared the World Design Capital in 2022.

As the United Nations (2014) expected 90% of urbanization to come from the African and Asian continents, Bangkok is also expected to reach "megacity" status by 2030. By then, Bangkok's official population is expected to reach more than 10 million people. Presently, the city's urban area accounts for close to 80% of Thailand's total urban areas, but despite this fast growth, proper urban planning and regulations regarding area development have been lacking.

Therefore, the Thai government is attempting to facilitate structural change and deliver people from the middle-income trap to high-income country through technological innovation and digital development (*Thailand 4.0*), which includes the strategy to transform cities into smart cities with green and smart buildings (Jones & Pimdee, 2017). Combined with rapidly expanding mass transit infrastructure projects, Bangkok's building will continue upward and outward.

Smart buildings are also key elements in the development of smart cities, and significantly affect a citizen's quality of life (*Raman*, 2015). Furthermore, smart buildings consist of complex, interconnected systems. These can include their control and maintenance systems, heating, lighting and cooling systems, and security systems. To work efficiently, these systems need to communicate and coordinate with one another, and when performance is optimized,

smart buildings can save up to 30% of water usage, 40% of energy usage, and can help reduce building maintenance costs by 10% to 30% (*Raman*, 2015).

Design and architecture, therefore, touch on all aspects of our daily lives, and educational institutions need to be prepared for the inevitable technological changes that the professions demand. It is crucial that these institutions provide higher education that corresponds to the specific knowledge required by modern society and a 21st century professional workforce (Abbott, 1988).

Professionals, however, are not at all a new occupation and have a long history from medieval times (Kakihara & Sørensen, 2002). Some of the oldest professionals include the clergy and teachers, although they most likely were not recognized as such in their time. Architects have also had a long history of contributing to society as professionals with their expertise in designing and constructing buildings, with the word routed in many languages throughout history.

To achieve the quality of students' productivity, the curriculum is one of the most important factors in helping students learn. To meet the needs of enterprises in the future, the curriculum must be up to date with today's changing world. Therefore, the curriculum requires appropriate features for the profession, including the theoretical and practical aspects of the profession.

Production of professional 21st century knowledge workers, in particular, interior architectures and designer, is an important driving mechanism for Thailand's future development goals under the objectives outlined under Thailand 4.0. Architectural and interior design education is, therefore, a key element in the movement towards a system of more sustainable buildings and cities. With Asia leading the world in population growth and urbanization, it is necessary to educate professionals with a well-balanced and integrated knowledge of local issues and global standards (Álvarez, Lee, Park, & Rieh, 2016). We, therefore, examined the validity of the model suggested by Guerin and Martin (2010) for measuring the attributes of professional interior designers and architects in the 21st century. In addition, we wanted to study the opinions of those involved in both professional and academic teaching activities. Questions included: How do university graduates and professionals work in such professions? What are the characteristics of architectural interior designers? How different are they? What characteristics are least important in future work? Using the six main elements from Guerin and Martin (2010), an investigation and analysis were launched to see how the elements differed or were the same within the context of Thai curriculum development of professional interior designers and architects in the 21st century.

Literature Review

Interior Design and Architecture Regulatory Processes

According to Guerin and Martin (2010), within the profession of landscape architects, examination and regulation are tied closely together, with the American Council of Landscape Architectural Registration Boards (CLARB) acting as an association of member boards in the United States. Through their Landscape Architecture Registration Examination (L.A.R.E.), CLARB assesses the ability of prospective licensees to protect the public's health, safety, and welfare (http://www.clarb.org/**).** The L.A.R.E. was first offered in 1992, at which time 1,952 candidates sat for the examination; by 2009 that number had grown to 4,067.

Licensing and certification thereby strengthen the requirement for professional participation via *proof of specialist knowledge* (Pfadenhauer, 2006). However, the Internet is blurring the lines between the expertise and subsequent control of knowledge held by a profession, and others outside the profession (Guerin & Martin, 2010).

Abbott (1988) discussed a profession's reliance on the '*mystery*' of abstract knowledge and its supporting role in the process of professionalization, which applies abstract knowledge in a way beyond the routine use of a process. Pfadenhauer (2006) and Reeve (2016) also discussed that a profession will need to focus less on its initial phase of knowledge acquisition through formalized education, but instead rely more on its continuous development and updating of knowledge through monitored, continuing professional development, such as in lifelong learning.

Furthermore, many have come to realize that over time, professions change or cease to exist (Abbott, 1988). Furthermore, the path from occupation to becoming a profession is always varied, with no two professions following the same course (Romeo & Rigsby, 2008).

Further complications arise in professional licensing as to the definitions of designer and architect, as there has been a debate raging for many years around the terms architecture, interior architecture, interior design, and interior decoration. The discussion centers on the blurring of the lines that define the role and responsibilities of each profession, as where does the interior design of a space end and architecture begin, and vice versa (Yazıcıoğlu, 2015)?

Yazıcıoğlu (2015) has stated that there are various factors that have contributed to the ambiguity of the various titles, including the improvement of interior design education. Furthermore, many interior designers are becoming more involved with architectural and technical aspects of interior design, and less with the decorative, soft furnishings side. As a result, many interior design degree courses have been renamed as interior architecture degrees, to more accurately reflect what they cover. These changes according to Yazıcıoğlu (2015), have shot up in popularity, producing a growing number of architecturally savvy designers, and in turn making it more difficult to differentiate between architecture and interior design. However, for purposes of this study, the following terms are adopted, used, and defined:

Interior architecture is the balance of the art and science of designing an interior space, while taking into account all the elements involved in the build. However, professional accreditation from an architectural body is required by a designer to call themselves an interior architecture (Interior Design, 2017).

Interior design is a profession in which all aspects of planning and designing interior spaces in an environment is undertaken (Interior Design, 2017). Designers also play a pivotal role in human interaction with interior and architectural design (Kopec, 2017).

Interior decoration is concerned only with the decoration or 'art' of a space, including color schemes and soft furnishings (Interior Design, 2017).

Additionally, the Architect Council of Thailand (ACT) acts as an independent organization which works together to help the country control, regulate, promote, supervise, and advise on architectural related projects. ACT is under the supervision of the Ministry of the Interior, whose purpose is to issue rules and regulations, and providing licenses to four main types of architecture as prescribed in the ministerial regulations (Architect Council of Thailand, 2007).

Interior Design Professional's Characteristics

Guerin and Martin (2010) first conducted a study in 2005 on how design impacts the public's health, safety, and welfare. The study was revised and expanded to include a sample of 1,578 experienced interior designers. In the study, the design professionals were asked to rate their potential contribution to health, safety, and welfare across 65 knowledge areas, including daylighting; indoor air quality; ergonomics; and material, equipment, and product specifying. Those knowledge areas were grouped, for purposes of comparison, into six main categories which included: 1. Human Environment Needs; 2. Interior Construction, Codes, and Regulations; 3. Products and Materials; 4. Design Theory and Process; 5. Communication; and 6. Professional Practice.

From the synthesis of a review of the literature, we also chose to establish six main categories for investigation. They were as follows:

Design Theory and Process (TDP) Knowledge

TDP includes the theory, knowledge, and skills necessary for the design process. Elements include space planning principles, as well as theories concerning the use of color and light. Additionally, factors such as the best use of existing facilities, as well as the arrangement of space, equipment, and other features are considered. Evidence-based design (EBD) principles of natural light design (Cama, 2009) are also considered, along with principles of air conditioning design, sound design, historical design, and theories of sustainability.

Human Environmental Needs (NHE) knowledge

According to Guerin and Martin (2010), NHE includes knowledge about business, organizational, and family structures. It also includes topics such as ecological, socio-economic, and cultural contexts. Physical attributes such as lighting, acoustics, thermal comfort, and indoor air quality principles are also investigated. Occupant well-being and performance, as well as post-occupancy evaluation (POE), research, theories about the relationship between human behavior and the designed environment, and universal design are included. Finally, globalization and human factors are also considered.

Interior Construction, Codes and Regulations (ICCR)

Guerin and Martin (2010) also suggested an Interior Construction, Codes, and Regulation Category, which was indicated to contribute the most among all categories to safety. From it, the researchers included knowledge about internal architecture and building systems and equipment. Calculations, code requirements, laws, standards, regulations, accessibility, and sustainability are also included.

Product and Material Type (PM) Knowledge

Knowledge of materials, installation, performance criteria and finishes, custom work, floor, wall, and ceiling systems are included in this category (Guerin & Martin, 2010). Additionally, the interface of furniture with distribution and construction systems selection, and application of products and systems impact on indoor air quality are also included.

Professional Practice (PP) Knowledge

Knowledge of professional practice includes budgeting and estimating, ethical and professional standards, financial management, contract law, professional law, debt management, and liabilities. Collaboration with experts in various fields is also required, as well as professional development and project management (Guerin & Martin, 2010).

Communication (COM) Skills

In the communication category, Guerin and Martin (2010) determined that *critical listening* is the highest contributor to health and second highest contributor to safety and welfare, while *communication* (e.g., consensus building, collaboration, facilitation/ negotiation) was the highest contributor to welfare and the third highest contributor to health and safety. Construction documents were the highest contributor to safety, second highest contributor to health, and the fourth highest contributor to welfare.

Methods

According to Mertler (2007), in education research, if population size is around 1,500, a sample size of 300 is adequate. Also, beyond a certain point (n = 5,000), the population size becomes irrelevant and a sample size of 400 will be adequate. Increasing the size of the sample beyond this point is not critical but doing so will increase the confidence with which we can generalize the results. Therefore, we set an initial target sample size of 400 individuals from two groups of participants. These included academics and licensed interior architects.

1. From the most current list (2010) of Thai interior designers and architects teaching and licensed from the Ministries of Education and the Interior, a population of 92 individuals from eight locations was provided. From this list, multi-stage sampling was used to select the survey's population of 75 academics.
2. From a 2017 list provided by the Architect Council of Thailand, 1,760 names were provided as the population of interior architects licensed in the Bangkok metropolitan area. From this list, simple random sampling was used to select a preliminary list of 420 individuals. From this, 327 licensed professionals responded.

The instrument used in this research was a 2-part questionnaire about the characteristics of professional interior designers. Part 1 contained the introduction as

well as three items concerning the respondent's general information. Part 2 consisted of the 64 items and their attributes of professional interior designers.

The questionnaire items were structured by use of a 5-level, Likert type agreement scale with the anchor point of "5" indicating the highest level of demand, while "1" indicated the lowest level of demand. Verification of the questionnaire's content validity was confirmed using the index of consistency (IOC), which was determined to be 0.89 overall. To evaluate the internal consistency of constructs (ICR), Cronbach's α was used to test the unidimensionality of the 5-level agreement scale questionnaire items and measure to which extent all the variables are related to each other (Tavakol & Dennick, 2011). The scales used were ranked as follows: 1 = minimum, 2 = minimal, 3 = moderate, 4 = very high, and 5 = highest. Various scholars have reported on different acceptable values of α, ranging from 0.70 to 0.95 (Hair, Hult, Ringle, & Sarstedt, 2016). The reliability of the latent variables, however, were found to exceed all recommended minimums, and were calculated for knowledge of theory and design process at 0.92; for knowledge of the human environment at 0.89; for skills and knowledge of interior architecture and regulations at 0.91; for knowledge of product knowledge and material type at 0.90; for knowledge skills and professional practice at 0.94; and for skills, knowledge, and communication at 0.78.

The analysis of the data entailed a 5-step process, which included the following:

1. The analysis of the attributes of both academics and professional interior architects was conducted with the use of SPSS Amos version 24. Descriptive statistics used mean () and standard deviation (σ or S.D.).
2. The Kaiser-Meyer-Olkin (KMO) test was also used in confirmatory factor analysis (CFA) to test how well the data was suited. The KMO measure of sampling adequacy was used in conjunction with the Bartlett's test whose measures vary between 0 and 1, with values closer to 1 being better. A value of .7 is considered *middling/OK* (Hutcheson & Sofroniou, 1999).
3. Furthermore, Bartlett's test of sphericity was used to measure of sampling adequacy.
4. The CFA revealed that the model was consistent with the empirical data.
5. Multivariate analysis of variance (MANOVA) was also used to compare the characteristics of each group.

Results

Respondent's General Characteristics

An analysis of the respondent's data in Table 1 showed that within an academic setting, the majority of the lecturers were male (60%) and were between 31–40 years of age (47%). Furthermore, it seems within this discipline, most lecturers are only required to have a Master's degree (84%).

Within the professional practice, the male to female ratio was a bit more even at 53%/47%, with younger individuals involved in professional activities (38% were less than 31 years of age). Concerning education within the group, having advanced degrees does not seem to be a limiting factor as only 1.5% had a graduate degree.

Model Measurement

Table 2 shows the results of the analysis of the 402 academic and professional interior designer architects' knowledge management process. From the analysis, the descriptive statistics mean () was determined to be from 4.13 to 4.33, while the standard deviation (σ) was from 0.52 to 0.61. We then analyzed the confirmatory components to verify the consistency of the model with the empirical data. Results indicated that the correlation coefficients between the six variables were statistically significant at the 0.01 level, with the correlation coefficients between variables being correlated in a positive and the same direction.

The correlation coefficient showing the most significant relationship was between NHE and ICCR (0.673), which is the relationship between the NHE knowledge and the construction, and ICCR. This was followed by the relationship between the TDP knowledge and construction, ICCR knowledge (0.663). On the other hand, the lowest correlation coefficient

Table 1
Number and Percentage of Basic Information for Academic and Professional Architects

Basic Information	Academic (n = 75)		Professional Practice (n = 327)	
Sex	**Number**	**Percent**	**Number**	**Percent**
Male	45	60.00	172	53.00
Female	30	40.00	155	47.00
Total	**75**	**100.00**	**327**	**100.00**
Age				
20-30 years old	18	24.00	125	38.00
31-40 years old	35	47.00	112	34.00
41-50 years old	18	24.00	85	26.00
51-60 years old	4	5.00	5	2.00
Total	**75**	**100.00**	**327**	**100.00**
Education				
Bachelor	–	–	322	98.50
Master	63.00	84.00	4	1.20
PhD	12.00	16.00	1	0.30
Total	**75**	**100.00**	**327**	**100.00**

Table 2
Analysis of Distributed Data of Observed Variables used in the Component Analysis

Observed variables	TDP	NHE	ICCR	PM	PP	Com
TDP	1.000					
NHE	.639**	1.000				
ICCR	.663**	.673**	1.000			
PM	.462**	.483**	.595**	1.000		
PP	.514**	.510**	.557**	.653**	1.000	
Com	.481**	.479**	.541**	.642**	.640**	1.000
Mean	4.19	4.13	4.24	4.21	4.17	4.33
Std. Deviation	.53	.61	.57	.60	.57	.52

Note: ** p <0.01, correlation coefficient between observed variables chi-square = 1566.733, df = 15, p = .000.

was 0.462, which was the relationship between the TDP knowledge and product and material (PM) knowledge. Furthermore, measures of sampling adequacy (MSAs) was conducted, with KMO values between 0.8 and 1 indicating the sampling is adequate (Hutcheson & Sofroniou, 1999).

For the study, the MSA was .837. The chi-square values were chi-square = 1566.733, df = 15, p = 0.000, which are significantly different from zero at the 0.01 level. As the approach is close to 1, the correlation matrix of the observed variables was not a unique matrix, and therefore had enough correlation between

the variables to analyze the component and check structural integrity.

Table 3 and Table 4 show the structural integrity check of the 21st century interior design and architecture skills model (IDAS), with the confirmatory component analysis showing that the model was consistent. Verification of this comes from the empirical data chi-square = 7.015, df = 5, $p = 0.220$ ($\chi 2$ is not significantly different from zero at 0.05 and $\chi 2/df = 1.403$, which is less than 2). The value of the root mean square of error approximation (RMSEA) = 0.032, and the root mean square residual (RMR) = 0.004, which is close to 0. The goodness of fit index (GFI) = 0.994, adjusted goodness of fit index (AGFI) = 0.976, while the comparative fit index (CFI) = 0.999 (Table 3).

For the weight values, the components of each variable are positive. At the 0.05 level of significance, the most weighted variable was ICCR, with a component weight of 0.884. Communication (Com) skills have an elemental weight of 0.619. Moreover, the *coefficient* of determination (R^2), which describes the covariance of the model for measuring the attributes of the 21st-century architectural interior designers, ranged from 0.383 to 0.782, as shown in Table 4.

Table 3
Criteria and Theory of Values of Goodness-of-Fit Appraisal

	Criteria Index	Criteria	Values	Results	Supporting Theory
1.	χ^2- Sig. (p)	> 0.05	7.015	passed	Marsh, Hau, & Wen (2004)
2.	RMSEA	< 0.05	.032	passed	Bentler (1990)
3.	CFI	> 0.93	.999	passed	Bentler (1990)
4.	GFI	> 0.90	.994	passed	Jöreskog & Sörbom (1996)
5.	AGFI	> 0.90	.976	passed	Jöreskog & Sörbom (1996)
6.	RMR	< 0.05	.004	passed	Kline (2005)

Table 4
Confirming Element Analysis Results of the IDAS Model (n = 402)

Element	Observed variable	Factor loading				
		b_{sc}	S.E.	t	p	R^2
IDAS	**TDP**	.749	<- ->	<- ->	<- ->	.383
	NHE	.761	.048	24.173	.000	.416
	ICCR	.884	.088	14.563	.000	.433
	PM	.658	.081	12.358	.000	.782
	PP	.645	.076	12.100	.000	.580
	Com	.619	.069	11.598	.000	.562

Note. b_{sc} measures the factor loading, R^2 is the *coefficient* of determination, the symbol <- -> indicates a mandatory parameter, so it does not report the S.E., t, and p values. Chi-Square = 7.015, df = 5, p = .220, $\chi^2/df = 1.403$, RMSEA = .032, RMR = .004,GFI = .994, AGFI = .976, CFI = .999

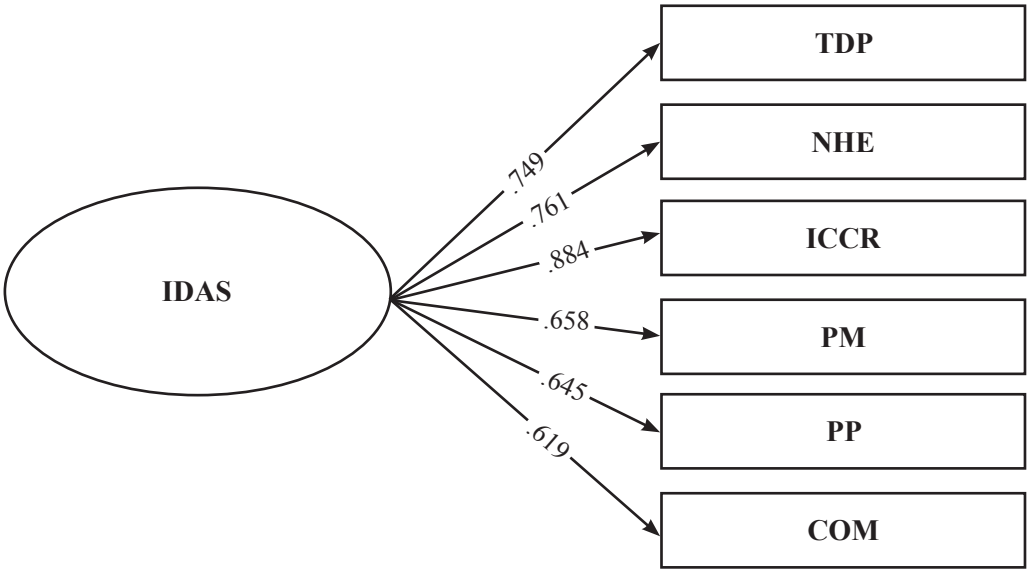

Figure 1. The IDAS Model for interior architects and designers.

Table 5
Multivariate Testing Analysis

Independent variables	Statistics	Value	F	Sig
Group	Pillai's Trace	.022	1.426	.190
	Wilks' Lambda	.978	1.426	.190
	Hotelling's Trace	.022	1.426	.190
	Roy's Largest Root	.022	1.426	.190

Note: Box's M test of equality of covariance = 76.302, F = 3.524, Sig .161, Bartlett's test of sphericity = 1600.631, Sig .000

We then compared the characteristics of interior architectural and designers who worked as either academics or architectural professionals by use of MANOVA (Zaiontz, 2015). When performing MANOVA in SPSS, the Box's M test of equality of covariance and Bartlett's test of sphericity are both commonly used. Concerning Bartlett's test of sphericity, the Sig value = 0.161, which is greater than 0.05. All six attributes were, therefore, statistically significant at .05, so MANOVA was able to be analyzed. In addition, we used Box's test of equality of covariance and determined that the significant value = 0.000, which is less than 0.05 and indicates that the variance matrix–covariance statistical analysis of MANOVA was not statistically significant. The comparison of academicians and architectural practitioners was not a significantly different, as shown by the statistical significance of .05 in Table 5.

Discussion

The research found that there are six major components which are all very important in the education of professional interior designers and architects in a 21st-century environment. This is supported by the executive summary from the interior

design body of knowledge (BOK) study in which it was stated that all the categories from the report also contribute at the substantial level to health, safety, and welfare (**Interior Design Educators Council**, 2011). Both this study's IDAS model and the interior design BOK study showed remarkable similarities in their findings, considering the space and time between their respective samples.

Concerning the IDAS model, the six elements we identified as critical skills are constantly evolving. As construction and sustainability solutions change, the educators and their respective institutions must keep pace with these changes and the technologies they use.

Interior Construction, Codes, and Regulations (ICCR)

The ICCR category contributes the most to safety. Elements in this category include code requirements, laws, and standards. Additionally, it also includes life safety, as well as interior and building construction. These elements are directly associated with the protection of individuals from physical hazards within an environment. For this study, proof of this fact comes from ICCR's weight of 0.884. It should be noted, however, that although the perceptions of ICCR's importance is nearly identical in both Western countries and that in Thailand, the mechanisms to achieve it are significantly different.

According to a study on Asia APEC (*Asia-Pacific Economic Cooperation*) Building Codes, Regulations, and Standards, Thailand does not use the code system with which the United States, Canada, and Australia are familiar (Chong, 2013). Thailand's building control laws and regulations on the other hand, originate as ministerial regulations, and are passed by the parliament before a Royal Decree is issued to endorse the ministerial regulations. The completed ministerial regulations are known as Acts, which are then converted into enforceable regulations by the appropriate Thai government agency.

Furthermore, according to Chong (2013), mandatory codes are applicable only in Bangkok's Metropolitan Municipality, districts under the Town Planning Act, and for any buildings either larger than 1000 square meters or with more than 500 occupants (whichever is smaller). Provinces, however, are required to adopt their own regulations, and can introduce additional rules. Regional offices are set up to assist the provinces, municipalities, and cities.

Human Environmental Needs (NHE) Knowledge

Second in importance to Thai interior architects and designers is NHE, with a weight of .761. This is consistent with this category contributing most to HSW (health, safety, & welfare) combined, and highest in contribution to both health and welfare independently, as reported by the Guerin and Martin (2010) report. NHE contains elements that are the heart of interior design practice, such as universal design, human factors, occupant well- being, lighting, acoustics, thermal comfort, and IAQ.

Design Theory and Process (TDP) Knowledge

Knowledge of TDP ranked third in importance, with a score of .749. It is also considered a large category and entails many elements. In other studies, these elements dealt with '*natural and electrical lighting design principles*' as the highest contributor to health and welfare and third highest contributor to safety. This element includes knowledge of '*daylighting, lighting, color, quality, sources, controls, and the selection and application of luminaires and light sources'* (Guerin & Martin, 2010). This element also contains a significant amount of abstract knowledge that is the foundation of responsible design.

Product and Material (PM) Types Knowledge

The PM category also contributes at a substantial level across HSW (.658). Abstract knowledge such as building materials and finishes; performance criteria; and selection and application of products and systems impact indoor air quality are representative of the importance of this category's elements. In the PM category, *selection and application of products/ systems and their impact indoor air quality* is the highest contributors to health and welfare, which also includes the contribution to safety such as toxicity. It is also interesting to note that according to Guerin and Martin (2010), furniture, fixtures, equipment, and finish materials are the greatest contributors to safety.

Professional Practice (PP) Knowledge

Knowledge of PP is also important (.645) to Thai interior architects and designers. Also, '*consultation with consultants'* has the highest contributor in all three areas of HSW, at the substantial level. Perhaps this element contributes at the highest level as it includes all consultants in areas of design that cross over interior design practice and with whom an interior designer works depending on project scope, part of which may require knowledge outside the interior design BOK (Guerin & Martin, 2010). Consultants are not limited, to but can include, acoustical and audiovisual consultants, architects, contractors/construction managers, decorators. electrical, structural mechanical, civil engineers, graphics/signage designers, and lighting, electrical, plumbing, and HVAC consultants.

Communication (Com) Skills

Communication was judged by respondents as the least important (.619) of the six surveyed main variables. It does, however, contribute significantly to welfare, which is higher than its contribution to health or safety (Guerin & Martin, 2010). One possible reason for communication's lower perceived value could be its focus on legal, ethical, financial, and business operations issues. These elements focus on the internal factors of practice that directly affect people's financial stability and success.

Conclusion

A profession is identified by society and the public as having expertise based on specialized knowledge. The process of becoming a profession, or professionalization, is *'how modern societies institutionalize expertise'* (Abbott, 1988, p.xii). According to Guerin and Martin (2010), interior design practitioners, are individuals who through their practice or work, defines and adds to abstract knowledge that develops the body of knowledge, which adds to the development of the profession.

Education in Thailand concerning these professions should, therefore, embrace the six main elements of this study in the creation of professional architecture and interior design curriculum. Its importance cannot be stressed more, as so many of these factors rest in the successful design and implementation of moving Thailand's rural population to the cities. Urbanization is a fact of life, and how this is accomplished will ultimately play a significant role in the health, safety, and well-being of Thailand's urban and rural populations.

Educators and policymakers must think outside the box and use the broad resources of the profession to design environments which are user-friendly and environmentally sustainable. Resources such as water and sunlight are precious commodities, and professionals need to better understand how to collect and utilize their potential. Under Thailand 4.0, the vision for the future lies to a great degree on the 21st-century knowledge and worker's ability to create and critically think. Education in the six key elements of this study will go a long way in building the infrastructure and environments necessary for these workers to accomplish their appointed tasks safely and happy.

Ethical clearance:

The study was approved by the institution.

Conflict of interest:

None.

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